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Volume 8 | Issue 2 Article 3

1945

Poultry Husbandry

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Prevention and control of disease

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THE BILLION dollar poultry industry of the United States has grown tremendously in the last three decades. Almost all of the scientific advancement in this field has occurred in this period. The disease control has definitely lagged behind the growth of the industry. In 1920 the death rate among chickens was 10 per cent; in other words, ten birds in every hundred placed in the laying house died. By 1930 the death rate had increased to 15 per cent; by 1934 to 20 per cent and by the end of 1937, it had increased to 24 per cent. These were the laying house mortalities. The brooder house mortality was reported to be about 20 per cent which is another additional loss to the poultry raiser. The Bureau of Animal Industry's 1942 report shows losses in all animals in the United States due to disease to be $418,000,000; of this amount $255,000,000 is reported to be due to poultry disease.

Sanitation

When one considers the many diseases of poultry and the deplorably ineffective methods of treating some of these diseases, it can easily be seen that the proper approach to many of the disease problems is through the application of sanitation and hygiene.

Since veterinarians are charged with the responsibility of diagnosing and treating poultry diseases, they should be ready to recommend preventive measures in the form of a program of sanitation and hygiene.

There are no fixed rules of sanitation, for practices that are effective under some conditions are ineffective under others. The climate and the attention to details vary the results. As the numbers of birds in a flock increase, the hazards of disease proportionately increase.

Separation

Chicks should be hatched, brooded and raised entirely separate from adult birds. By this process the life cycle of internal and external parasites is broken. The spread of most bacterial and virus diseases is checked. *Salmonella pullorum* which causes pullorum disease, *Shigella gallinarum* which causes fowl typhoid, and the etiological agent of the avian leukosis complex may be transmitted to the chick through the egg from the infected hen. Hens can be tested for the presence of pullorum disease and fowl typhoid and can consequently be removed from the laying flock. Flocks free from the avian leukosis complex should be used for the production of hatching eggs. The diagnosis of this condition is made by a post mortem examination and a notation of the symptoms.

Healthy Stock

A sound poultry production program entails the beginning of a flock with the introduction of healthy chicks. It is generally hazardous to bring adult poultry onto one's premises. There is the possibility of carriers being introduced. The presence of fowl typhoid, pullorum, and tuberculosis can be determined by conducting laboratory tests, but other diseases may be present and not be detected.

*Doctor of Veterinary Medicine, Iowa State College August 1945.

For this same reason many poultrymen will not return birds to their flocks after they have entered in shows or contests.

The brooder house into which the chicks are put should be scraped clean and scrubbed with boiling water containing sodium hydroxide in the form of commercial lye at the rate of one ounce to the gallon of water. The walls and floors should next be saturated with a reliable disinfectant.

Brooder House

The brooder house should then be moved to ground on which there has been no poultry for two years. It is advantageous if the soil has been tilled for one year of the rotation. The hot summer sun will sterilize the soil and the subsoil as it is turned up. Sandy soils tend to dry out soon after a rain. The filth is carried below the surface more readily in the porous soil than it is in the clay soils. The abundance of oxygen in the porous soil tends to destroy organisms while the supply of water in clay soil tends to preserve them. The range area should not be one over which much traffic occurs from which infection could be brought from other poultry areas. The ground should not be contaminated by drainage from other poultry range areas, poultry manure from other areas should not have been spread on it, and the area should be well-drained.

Soil

The soil should be sufficiently fertile to support a luxuriant growth of vegetation. The plants, such as Ladino clover, that "stool out" and form a mat are preferred to the grasses and upright growing plants, such as alfalfa, which allow the bird to walk upon and eat from the ground. The "mat type" plant growths allow the infected droppings to fall to the ground while the bird eats from the plants above the contaminated level.

Poultry should be kept separate from other farm livestock largely because of dissemination of disease from the fowl to livestock and vice versa. Avian tuberculosis is the source of tuberculosis of sheep and especially swine; avian tubercle bacilli are capable of sensitizing cattle to mammalian tuberculin. This, of course, results in condemnation of uninfected cattle when they are subjected to the tuberculin test. Poultry may be infected with Brucella organisms and may transmit brucellosis to mammals. Poultry infected with anthrax may spread this disease to other birds and livestock. *Erysipelothrix rhusiopathiae* causes a septicemia in several species of birds, both domestic and wild. Poultry are susceptible to the virus of rabies, *Pasteurella pseudotuberculosis,* the virus of foot and mouth disease, and the virus of equine encephalomyelitis.

Species Separation

The various species of poultry should be raised separately. Turkeys serve as carriers of the gapeworm *(Syngamus trachea)* and transmit the parasite ova to susceptible chicks. Adult fowls under range conditions are resistant. Chickens carry the organism causing blackhead in turkeys *(Histomonas meleagridis)* in their intestinal tracts. Poults contract the disease by exposure to the infected birds or from contaminated ground and then die in large numbers. Only in exceptional cases do chickens show any symptoms of the disease. When they recover, they become carriers of the disease. Many external and internal parasites of poultry are common to other species and can easily be spread from one species to another.

It has been estimated that 90 per cent of poultry disease is spread by contaminated soil and floors. In case clean range is not available the chicks may be allowed to exercise on a wire mesh floor above the ground. Crowding, chilling, and overheating should be avoided because these conditions tend to predispose the chicks to a number of diseases.

The brooder house windows should admit a large amount of sunlight through glass-substitutes which allow the entrance of ultra-violet rays. Clean, dry litter should be changed every week.

The feed hoppers and waterers should be constructed so that the birds can not defecate or stand in or over them. The

water should come from a deep well or a surface well which can not be contaminated by surface drainage. Pools, ponds, and slow running streams should be avoided because of the perpetuation of infection around such areas.

Shoe Disinfection

It has been recommended that a pan containing a mat soaked with a 3 to 5 per cent compound cresol solution be placed at the entrance to poultry lots and houses for the disinfection of the caretaker's feet to prevent the spreading of infection from one flock to another. Visitors that have possibly recently walked across another poultry lot which was possibly contaminated with disease organisms should be discouraged from walking over the poultry lots. Farm dogs as well as horses have been incriminated in the spread of disease from one flock to another by carrying the infection on their feet.

While the pullets and cockerels are on range they should have their range shelter moved every two to three weeks if possible. The waterers and feeders should be moved every week to avoid the perpetuation of areas of infection on the range.

Before the pullets are put into the laying house in the fall, it should be cleaned, disinfected, and allowed to remain empty for as long as a month, if possible, in order to destroy as many parasite ova, viruses, and bacteria as possible.

Pullets Separate

The adult hens should have been disposed of before the pullets are brought into the laying house. This prevents the transmission of tuberculosis from the old hens to the pullets. Old hens seldom lay enough eggs after July and August to pay their feed bill; the hot weather increases the mortality rate in the old birds, and tuberculosis begins to take its toll as is evidenced by the drop in egg production and loss of weight after the birds reach one year of age. Respiratory diseases are frequently carried by adult birds. If the pullets are brought into the same building, substantial losses among the pullets are suffered. Adult birds may be chronically affected by a great variety of other poultry diseases. It is definitely not a sound financial undertaking to put the pullets into the same house with the adults. If the owner wants to keep old birds they should be kept in a house separate from the pullets.

The construction of the ideal laying house varies with geographical conditions. The local agricultural experiment station can furnish plans for a building that is suitable for the local conditions. Houses should have their windows toward the south in order that more sunlight may enter and that the north wind may strike the closed back of the house. It is best if the laying house is built on the upper end of a slope so that the drainage of infective material is away from the house, and so that the infectious material from the range does not drain down around the house as it would if the house were at the bottom of the slope.

Laying House

There are certain general principles that should be followed in the construction of any laying house. The floor should be solid, smooth, dry and easily cleaned. A concrete floor is the best answer to this requirement. To prevent a concrete floor from being damp, a four inch layer of crushed rock should be put down; ten inches of cinders or coarse gravel should be packed over this; and the top layer should consist of three inches of concrete. The building should be durable, well-ventilated, well-lighted, arranged so that work can be done easily, and it should not be crowded. Four square feet of floor space per bird should be provided. Sometimes only three square feet per bird are available. These poultrymen get along fairly well if they are constantly aware of the increased need for vigilance with regard to hygiene and sanitation.

The droppings from the roosts should go on to dropping boards covered by wire mesh. If dropping boards are not used, the floor area beneath the roost should be screened off so that the chickens can not come in contact with the accumulated fecal material. As in the brooder house the waterers and feeders should

be so constructed that the birds can not stand or defecate in them.

Parasites

Most parasite ova and many of the microorganisms that infect poultry are eliminated in the feces. In the natural state, the fecal material was spread over such a wide area there was only a small chance of infection. When large numbers of poultry are confined to a small building the possibility of infection by ingestion of fecal material becomes much greater. The manure should be hauled away regularly. If piles of it are left around the poultry house, chickens scratch over it and pick up various infections. The poultry raiser should keep in mind that the sow bug, the dung beetle, ants, termites, cockroaches, flies, land snails, slugs, water fleas, ground beetles, and the earthworm all act as intermediate hosts for various parasites of poultry and if manure piles, pools of water, and piles of junk are not tolerated on the poultry premises, many of the parasite problems will be avoided. The manure should be used for fertilizer on ground that will not be contacted by poultry for three years.

House Disinfection

Periodic disinfection of the poultry house and equipment, following a thorough cleaning, tends to eliminate infectious organisms, external and internal parasites and their intermediate hosts. A 3 to 4 per cent saponified cresol solution is quite useful for this.

In order to prevent the perpetuation of disease around the laying house several plans are used. Some poultrymen recommend the using of three lots which are used for equal periods of time during that period of the year when poultry can be outside. These lots are seeded down and lie idle except for the two months each summer that they are used. Others recommend the using of the three lot system by using one lot a year in a three year rotation, one year of which each lot is tilled. Another method consists of providing a gravel exercising yard, the size being equal to the ground area of the laying house. The fecal material falls between the large stones which are in a layer two feet deep and the filth is washed away by the rain. The use of a wire mesh exercise pen built above an easily cleaned cement platform is advocated by some. Other authorities recommend keeping the laying flock in the house the entire year. All these methods are reported to give good results, and the method adopted will vary with the circumstances.

In any case no shade trees should be around the poultry lots, for the ground under these trees tends to become contaminated by the congregation of birds in these shaded areas, and there is lack of sunshine in these areas to kill the various pathogenic organisms present.

Disease Outbreak

In the case of an outbreak of disease in the flock, an early diagnosis is essential. This has considerable bearing upon the handling of the condition. If the birds must be sent to a laboratory for an accurate diagnosis, many of the other birds may die unless first aid measures are immediately instituted. These measures may stop the disease before it reaches *epizootic* proportions.

All visibly sick birds should be removed and be taken care of separately from the apparently healthy birds. All severely sick birds should be killed and burned along with those already dead. If the birds are on range the unaffected birds should be moved to clean ground daily. Any time any birds appear sick they should be put with the sick birds in quarantine. The houses occupied by both the sick and the healthy birds should be cleaned and disinfected daily. The litter should be burned. A large amount of litter should be used. An adequate diet should be provided, but the birds should not receive as large amounts of feed as they did before the disease outbreak. If large amounts of feed are available, the birds will eat at it all of the time, and if they are infected a large proportion of the feed can be contaminated due to the constant exposure to the infected birds. Potassium permanganate should be put into the drinking water at the rate of four grams (one teaspoonful) per gallon of water.

Putting the poultry on a diet consisting largely of buttermilk is a valuable aid in the control of many diseases, especially those of turkeys.

The birds should be kept warm and should be disturbed as little as possible. Crowding should be avoided.

Care of Sick Birds

If the same person cares for healthy and sick flocks, he should take care of the sick flock last and should disinfect his feet in a 3 to 5 per cent compound cresol solution after taking care of the sick flock.

As few as possible should come in contact with the sick birds in order to reduce the chance of the spread of infection.

Although the practice of sanitation and the application of hygiene in the poultry flock will not always prevent disease or prevent all losses in the case of an outbreak, the experiences of the successful poultrymen have shown that these methods are a sound financial undertaking and recommend them as being superior to any procedures which do not take these practices into consideration.

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Eggs may be kept fresh by oiling or boiling.

The oiling method makes it impossible for the average consumer to tell a new-laid egg from one six months old. To a light white paraffin oil (viscosity 50 to 60) add 6.25% pentachlorophenol to kill the shell-borne bacteria. Dr. W. L. Mallman of Michigan State College recommends a temperature of 70°F. for dipping. Farmers could treat their own eggs a few hours after they are laid. All the equipment needed is a small tank for oil, an egg basket for dipping the eggs, and a crock to set the basket of dipped eggs in until all excess oil has drained off.

The boiling process is just as easy. Immerse fresh eggs in boiling water for five seconds and air-cool them. That's all there is to it. What happens is that just enough of the egg white coagulates and sticks to the shell membrane to give the egg a better seal against evaporation than it has in its natural state.

Heat-treated eggs, stored in a refrigerator at 41°F. for 12 months, were of the same quality as untreated eggs stored for only three months. Neither the oil nor the flash heat treatment will replaced refrigerated storage but simply aid in maintaining better quality in storage eggs.

In determining the bacterial plate count of milk, "Standard Methods for the Examination of Dairy Products" requires that the plating shall be completed, i.e., dilutions made, plates pipetted, and the media poured, within an interval not exceeding twenty minutes after the first transfer is made from the sample.

It has been found by Hallaner that hens immunized by vaccination against fowl plague produce eggs containing immune bodies. These bodies are present in the yolk only. Chickens hatched from such eggs are immune to infection from fowl plague for 26 to 30 days when they begin to lose the acquired resistance. Such immunity has not been observed after vaccination for fowl pox or laryngotracheitis.

A careful study of the life span of living things, made by the late Dr. Raymond Pear of Johns Hopkins University, disclosed the following: Lower invertebrates live less than 100 hours, insects less than 100 hours up to 17 years, fish up to 267 years, amphibia up to 36 years, reptiles up to 175 years, birds 2-118 years, mammale 1½ up to 100 years.

Pigs given a subcutaneous injection of swine influenza virus obtained from the lungs of an affected hog exhibited no clinical evidence of the disease but acquired a solid immunity to subsequent exposure and to attempts to infect them artificially.